POSTER

ABSTRACT

MATTHEWS, Daniel
University of Pittsburgh

Reconstructing Redshift Distributions Using Cross-correlations of Spectroscopic and Photometric Surveys

Many of the cosmological measurements to be performed with future wide-area photometric surveys will require extremely well-characterized photometric redshifts. A conventional approach is to calibrate these photo-z''s using large sets of spectroscopic redshifts; however, even for objects 3 magnitudes brighter than future surveys will reach, current surveys on 8-10m telescopes only obtain secure redshifts for 40-70% of the objects with spectra. A powerful alternative approach is to exploit the clustering of galaxies to calibrate photometric redshifts. Measuring the two-point angular cross-correlation between objects in a photometric redshift bin and objects with known spectroscopic redshift, as a function of the spectroscopic z, allows the true redshift distribution of a photometric sample to be reconstructed in detail, even if it includes objects too faint for spectroscopy or if spectroscopic samples are highly incomplete. Here we describe new tests of this method using mock galaxy surveys constructed from the Millennium Simulation semi-analytic galaxy catalogs, allowing us both to verify the technique and optimize methods. A key finding is that errors are dominated by sample/cosmic variance and hence are largely determined by the area covered by spectroscopy; a dense spectroscopic survey covering a few square degrees would not be sufficient for calibrating LSST photometric redshifts, but a wide area survey with ~100k objects within a 500-1000 square degree overlap region would suffice. Combining photometric and wide-area spectroscopic surveys in the same region of sky will be a powerful tool for future cosmological experiments.